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ABSTRACT

In the first section of the document the author uses reviews of selected studies to provide a cross-section of methodologies used in evaluating vocational and technical education programs. The second section takes a formal model developed for the evaluation of vocational education (Central Kentucky Research Coordinating Unit, 1972) and explains the types of information and methods which can be used to obtain the information at each phase of the model. The last section of the document provides suggestions derived from the author's experience while coordinating the evaluation of the Skyline Career Development Center in Dallas, Texas. These considerations are broken down into context and process evaluation. An epilogue, flow charts, and a 54-item bibliography are included. (For companion documents covering Facilities Evaluation, Personnel Evaluation, and Student Evaluation see CE 000 988, CE 001 153 respectively.) (Author/KP)

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Information
Series No. 98

PROGRAM EVALUATION

IN

VOCATIONAL AND TECHNICAL EDUCATION

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Clearinghouse on Vocational
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PROGRAM EVALUATION

IN

VOCATIONAL AND TECHNICAL EDUCATION

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FOREWORD

Vocational and technical education has enjoyed high visibility during the past few years and with it increased pressure to account for expenditures and to justify programs. As a result, educators are ever alert for effective means of evaluating their educational programs. This publication and its three companion documents (*Personnel Evaluation in Vocational and Technical Education, Facilities Evaluation in Vocational and Technical Education,* and *Student Evaluation in Vocational and Technical Education*) provide educational practitioners with a review and synthesis of the most important works in evaluation as it applies to vocational and technical education.

In *Program Evaluation in Vocational and Technical Education*, the author previews selected studies which provide a cross-section of methodology used in evaluating vocational and technical education programs. The various phases of program evaluation are documented and context evaluation and process evaluation are addressed in terms of a real situation at the Skyline Career Development Center in Dallas.

The profession is indebted to William T. Denton for his scholarship in the preparation of this report. Recognition is also due Gordon Law, Department of Urban Education, Rutgers–the State University; and Donald L. Rathbun, Associate Director, American Vocational Association for their critical review of the manuscript prior to final revision and publication. Paul E. Schroeder coordinated the publication's development, and Alice J. Brown and Paula Kurth provided the technical editing.

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INTRODUCTION

The purpose of this paper is to present information relative to the state of the art in evaluation of vocational and technical education programs. The first section of this paper is not intended to be an exhaustive review of the literature; however, it does present some reviews of studies in the field of vocational and technical education that are related to the topic: evaluation of programs. These studies were chosen for review so the reader might obtain a feeling for the wide range of methods by which programs are evaluated. The results section of the reviews demonstrates the diversity of information that can be provided through evaluation.

The second section of the paper takes a formal model developed for the evaluation of vocational education (Central Kentucky Research Coordinating Unit, 1972) and explains the types of information and methods which can be used to obtain the information at each phase of the model. Appropriate references are made to the literature to direct the reader to additional sources of information.

The third section of the paper is devoted to some suggestions which the author has found to be practical from his experience while coordinating the evaluation of the Skyline Career Development Center in Dallas, Texas.

The anticipated audience for the paper is the practicing educator who finds himself, because of either external demands or personal desires, needing to evaluate a program in the area of vocational and technical education. The paper should also prove useful to the administrator who wants to learn more about the complex field of evaluation.

It is the position of the author that, although the demand for program evaluation is often from an external funding source, the primary beneficiary of an evaluation is the local agency. That is, the information provided by a comprehensive evaluation for the purpose of structuring a program at the local level should exceed any requirements of an external agency. This bias undoubtedly is reflected in this paper.

For the sake of clarification, the definition of evaluation as used in this paper is that of Guba (1968:23) "Evaluation is the process of . . . obtaining and . . . providing . . . useful . . . information for making . . . educational decisions."

A REVIEW OF SELECTED STUDIES

The following reviews of projects are chosen to exemplify the diversity of ways in which evaluation information can be obtained. The methods of evaluation vary from statistical analysis to a review of documents. The personnel involved in collecting the information also vary from outside consultants to students. The important point in each case is that information was provided to effect the decision-making process.

Educational agencies are always on the alert for new, innovative programs and the local evaluator is often asked to provide inputs about the relative merits of innovative programs prior to pilot testing.

The Classification and Evaluation of Innovations in Vocational and Technical Education

The following study was designed to develop a model for evaluating innovations.[1]

Project Overview. The project was set up to develop and field test a taxonomy of innovations appropriate for vocational and technical education. A consequent purpose was to develop guidelines for evaluating innovation characteristics.

Purpose of the Evaluation. Once designed, the classification system was field tested to determine how project personnel at exemplary project sites would rate individual items. The input thus provided helped determine the final system.

Methodology. The Innovations Evaluation Guide was initially developed after a review of the literature and interviews with six "innovative" superintendents and their staff. The guide was then pilot tested in a junior high school for clarity and readability, followed by a

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[1]William L. Hull and Randall L. Wells, *The Classification and Evaluation of Innovations in Vocational and Technical Education*, Final Report, Research and Development Series No. 71 (Columbus: The Center for Vocational and Technical Education, The Ohio State University, 1972).

field test at four exemplary project sites which were chosen by a branch of the U.S. Office of Education. The field test consisted of staff members at the exemplary sites rating each of the items in the Innovations Evaluation Guide as to whom the item was important: teacher, administrator, or both. Each item was rated as to how essential it was. State supervisors and local project directors of exemplary programs attending a national conference also participated in the field test. The data thus collected in the field test were used to make final revisions of the Innovations Evaluation Guide.

Results. "A comprehensive taxonomy which classifies discrete vocational-technical innovations into mutually exclusive categories was not possible with our present level of knowledge and technology" (Hull and Wells, 1972:39).

Probably of more importance, however, is that the Innovations Evaluation Guide can be used by those faced with the enormous problem of finding and choosing innovations to meet locally identified needs. It is interesting to note that in evaluating innovations, respondents chose as the most essential items quantity of staff costs, availability costs, availability of dollars, space (housing), sources of dollars, hardware, and complexity. Those items chosen as least essential were: rate of learning, entry and advancement in an occupation, new relationships among groups, cyclical considerations, economic and social efficiencies, reliability, and divisibility (Hull, 1972).

The Annual Vocational Report of Louisiana's Vocational and Technical Program—Fiscal Year 1972

Oftentimes an evaluation must be done from existing documents, especially in the case of state agencies. This study is an example of such an evaluation.[2]

Project Overview. Any state desiring to receive funds under the Vocational Education Amendments of 1968, Public Law 90-576, must establish a state advisory council. Among other duties, the state advisory council must . . . "evaluate vocational education programs, services and activities under this title, and publish and distribute the results thereof; . . ." (Strong, 1972:1). This report fulfills that requirement.

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[2]Merle E. Strong and Daniel Jarosik, *The Annual Vocational Report of Louisiana's Vocational and Technical Education Program—Fiscal Year 1972* (Baton Rouge: Louisiana State Advisory Council for Vocational and Technical Education, 1972).

Purpose of the Evaluation. In addition to fulfilling the requirements of the Vocational Education Amendments of 1968, the evaluation had three additional purposes: (1) "to provide information on Louisiana's Vocational and Technical Education Program, including its strengths and possible weaknesses from which the State Advisory Council can draw conclusions and make recommendations; (2) to serve as a basis for reporting to the citizens of Louisiana by the State Advisory Council; and (3) an evaluation of the degree to which Louisiana has met the needs of employers and individuals for vocational and technical education" (Strong, 1972:3-4).

Methodology. Data for this study were compiled from state reports, other available studies (including state and national studies), and from discussions and interviews mainly with state vocational education staff members.

Results. The survey staff made 13 recommendations upon completion of their study. Some of these recommendations are possibly of interest only to the state. Those recommendations likely to be of general interest include:

(1) "That the Louisiana State Board of Education and State Superintendent be encouraged to develop a long-range master plan for vocational and technical education" which would require taking into consideration total manpower training needs and a related plan for fiscal expenditures.

(2) "That guidance and counseling be strengthened at all levels of education, K through adult" so that students may be better prepared to make future decisions.

(3) "That every effort be made to keep vocational education in Louisiana abreast of labor market trends." In spite of a lack of precise data related to labor needs, programs must be justified based upon projected manpower needs.

(4) "That evaluation procedures be implemented to monitor—Exemplary Programs so that the most worthwhile attributes of the projects may be disseminated for the general use of all schools."

(5) "That greater communication and articulation occur between secondary schools, post-secondary vocational-technical schools, and colleges and universities in regards to curriculum and the needs of students" to assist students transferring from one institution to another.

(6) "That more extensive follow-up studies be instigated on both the secondary levels" and not be limited to only three months after graduation but to be extended to at least one year after graduation (Strong, 1972).

Career Awareness/Job Orientation via Taped Television Programs

Many times programs are developed to change attitudes. This is an example of how one district determined attitudinal changes.[3]

Project Overview. In an effort to encourage more students to enroll in vocational-technical education courses, the Hazelton, Pennsylvania, School District tested the effectiveness of taped television programs in informing students about jobs and careers. The hypothesis was that positive attitudes toward selected careers could be developed in children by having them view taped television programs specifically designed to inform them of various aspects of each career. The project was aimed at improving the job awareness/career awareness of sixth grade students and the job orientation of ninth grade students. Five job areas were selected: (1) Data Processing, (2) Drafting, (3) Food Service, (4) Printing/Graphic Arts, and (5) Welding.

Purpose of the Evaluation. The evaluation was designed to determine what attitudinal changes occured in students after viewing a taped television presentation about a specific job area.

Methodology. A randomly selected sample of 50 sixth grade students were shown a taped television presentation designed to impart information about a job area. A film was shown for each of the five job areas. Students were pretested immediately before and post-tested immediately after each presentation. The instrument was the same for both pretest and posttest and consisted of 18 items to which the students were asked to respond using a Likert-type scale. Each student's score was taken as the sum of the individual item responses. A randomly selected sample of 50 ninth grade students was similarly treated except that students were shown presentations designed to impart information at the job orientation level and they also participated in a group discussion immediately after each presentation. Statistical significance was determined by submitting each set of data to a "t" test analysis for correlated variances. "The sample variance was used to statistically examine whether or not there was significant difference between the sample pretest attitudinal variability and the sample posttest attitudinal variability" (Bernabei, 1972:12). The null hypothesis in each case was: S^2pretest - S^2posttest = 0.

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[3]Raymond Bernabei and James Case, *Career Awareness/Job Orientation via Taped Television Program,* Experimental Study (Doylestown, PA: Bucks County Public Schools, 1972).

Results. At the sixth grade level, " . . . the null hypothesis was rejected at the .025 level for the Printing/Graphic Arts and Welding job areas, at the .25 level for the Data Processing job area, and there was insufficient evidence to reject the null hypothesis for the Food Service and Drafting job areas" (Bernabei, 1972:13). Loosely interpreted, this means that the taped television presentations did affect student attitudes only in the Printing/Graphic Arts, Welding and Data Processing areas.

At the ninth grade level, "the null hypothesis was rejected at the .025 level for the Food Service job area, at the .05 level for the Printing/Graphic Arts job area, at the .25 level for the Drafting job area, and there was insufficient evidence to reject the null hypothesis for the Data Processing and Welding job areas" (Bernabei, 1972). Again, loosely interpreted, this means that student attitudes were affected except in the areas of Data Processing and Welding.

CVAE Academic Curriculum Project

This study is an example of an evaluation to determine the extent to which a program met its specifically stated objectives.[4]

Project Overview. The second year of the Coordinated Vocational-Academic Education (CVAE) Academic Curriculum Project was devoted to the development and field testing of individualized curricula at the junior high level. Curricula included mathematics, social studies, and language arts at the eighth grade level and mathematics and science at the ninth grade. The field test took place in the Austin Junior High School, Pharr-San Juan-Alamo Independent School District, in the lower Rio Grand Valley of Texas.

Purpose of the Evaluation. The evaluation determined the extent to which the project was meeting its goals.

Methodology. The field test was conducted with six teachers and approximately 120 students who were predominantly Mexican American and economically disadvantaged. At the beginning and end of the field test period (the first semester of the 1971-72 school year), students completed a short questionnaire designed to measure their: (1) preferences for school subjects, (2) self-concept of school ability, and (3) attitude toward school. Periodic

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[4]Education Service Center Region 1. *CVAE (Coordinated Vocational-Academic Educational) Academic Curriculum Project Evaluation Report, 1971-72,* (Edinburg, TX: Education Service Center Region 1, 1972).

classroom observations were made to determine the degree of implementation of the curricula and the type and extent of student activities. Data such as school attendance and student discipline were obtained from school records. Curriculum imbedded criterion-referenced tests were used as a measure of student achievement.

Results. Students' attitudes toward school and self-concept of school ability showed no statistically significant gains. A significant number of ninth grade students changed their opinion of science from "dislike" to "like." Classroom observation data showed that the curriculum was individualized and students spent a large portion of their time in individual activities. The rate of absenteeism dropped from 8.9% to 7.9% and the rate of CVAE disciplinary referrals dropped from 28.4% to 11.7%. "Students demonstrated mastery of specific performance objectives, from 88.7% to 99.8% in the different curriculum areas. More significantly, they demonstrated short-term retention rates which varied from 33.2% to 77.4%" (Education Service Center, 1972).

Evaluation Model for Career Programs

After developing an innovative curriculum, a district is often left with the problem of how to validate the appropriateness of the curriculum. Here is how one local agency handled that challenge.[5]

Project Overview. This project was designed to develop and test a model for qualitatively evaluating career programs. The results of the evaluation specify curricular areas possibly in need of revision.

Purpose of the Evaluation. To determine the effectiveness of the evaluation model under actual conditions.

Methodology. The two career training areas chosen for this study were (1) dental assistant, and (2) auto mechanics. The curriculum in each of these areas was written in a format which included precise behavioral objectives. To determine the appropriateness of the curriculum in each training area, a population of interested and involved judges was identified. This population consisted of the following six groups: (1) students, (2) instructors, (3) advisory board, (4) graduates of the two training areas, (5) employers of graduates from the

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[5]Richard L. Byerly, et al., *Evaluation Model for Career Programs,* Final Report (Ankeny, IA: Des Moines Area Community College, 1972).

two training areas, and (6) businessmen who have not yet, but may in the future, hire graduates of the two training areas. A population of the above mentioned judges was identified for each of the training areas. The judges were asked to rate each behavioral objective in their training area using the following scale:

0 – of no importance
1 – desirable but not necessary
2 – desirable and necessary
3 – absolutely essential

Each of the training areas was divided into subareas. Group respondent scores were combined for each subarea and a mean was computed. An analysis of variance was then conducted to determine if any significant differences existed. If significant differences were found, paired "t" tests were used in an attempt to determine which groups were responding differently.

Results. Several sub-sections in each of the training areas were found to contain significant differences. For example, in the electrical subarea of auto mechanics, the analysis of variance was significant at the .05 level. The paired "t" tests indicated that the employers, students and ex-students were placing less emphasis on these items than the other three groups.

> Using this approach, there were several areas where significant differences did exist between groups. These differences illustrate that the six groups perceive the tasks at different stratas of importance. The implication, therefore, is that curricular revision may be necessary in these areas where divergence was apparent. If revision is not necessary, at least closer examination of the curricular differences could be accomplished (Byerly, et al., 1972:40).

Project VIGOR

This study made extensive use of the written questionnaire to obtain information. It also has the rather unusual characteristic of having a student conduct a portion of the evaluation.[6]

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[6]David Douglas Public Schools, *Project VIGOR: Vocational Cluster Education, Integrated and Articulated Grades 1 Through 14 with Guidance Services, Occupational Exploration and Work Experience Relevant to General Education,* Final Evaluation, (Portland, OR: David Douglas Public Schools, 1972).

Project Overview. Project goals extend from career awareness at the primary grades to student follow-up and placement at the post high school level.

> Through Project VIGOR, the David Douglas Public School System (Portland, Oregon) is addressing itself to the objective of changing a conventional academically-oriented, general education school system into one whose curriculum reflects the needs of all students regardless of entry into their chosen vocation (David Douglas Public Schools, 1972).

Purpose of the Evaluation.

> The evaluation was purposely designed as a very subjective, human oriented evaluation strategy. The overall purpose was to gather as much information as possible about current teacher and administrator knowledge, feelings, and attitudes about project status for developing base line information for more sophisticated future evaluation (David Douglas Public Schools, 1972:9).

Methodology. Eight separate questionnaires were developed to ellicit responses relevant to project goals and/or objectives. These questionnaires were given to two different groups–administrators and teacher-counselors–at four different levels: elementary (grades 1-6), middle school (grades 7-8), junior high (grades 9-10), and senior high (grades 11-12). The response ratio was 60% from teacher-counselors and 85% from administrators. To verify responses obtained from the questionnaires, an interview was conducted with 33 David Douglas teachers, counselors and administrators. In addition to the questionnaires and interview, student information was collected by a member of the senior class at David Douglas High School. The student information was relevant to the knowledge and attitude of ninth grade students toward career education.

Results. The findings and conclusions reported were substantial; those of general interest include the following. Awareness programs at grades 1-6 may become the unifying thrust needed for other components. However, "two apparent inhibitors of program changes within the institution: (1) the contention that this isn't really new, just a different language; and (2) the conviction that 'this too shall pass away if we all just ignore it' " must be reconciled (David Douglas Public Schools, 1972).

The evaluator recommended that these inhibitions "might be overcome by evidence of positive results from the career education program" (1972). It was interesting that most administrators appeared to understand the thrust of the project while few teachers did. While involvement of employers and community groups was successful, there were limitations on the range of experiences which could be provided students due to the physical makeup of the local community. Considerable more effort is needed to increase ninth grade students'

knowledge of the career education concept and its relation to subject areas. To allow for a more comprehensive evaluation of the project, "indicators of performance and/or accomplishment need to be detailed for each project component" (David Douglas Public Schools, 1972).

Central Kentucky Vocational Education Evaluation Project

This study had several purposes including the development of a formal model for evaluation of vocational education.[7]

Project Overview. The Central Kentucky Vocational Education Evaluation Project (VEEP) was a pilot project designed to develop expertise at the appropriate level for organizing and implementing an effective evaluation of vocational programs. Its objectives were to:

1) identify new or improved procedures for assisting schools in conducting program evaluation,

2) test and demonstrate evaluation procedures to determine whether the secondary and post-secondary programs of vocational education in Central Kentucky are fulfilling the stated objectives,

3) develop state and local leadership competencies needed for evaluating programs of vocational education, and

4) enable personnel in the local and regional schools to be more proficient in the various tasks necessary for an adequate evaluation.

The project focused on product evaluation which emphasized students' attainment of criterion behavior as stated in objectives. The project activities consisted of conducting conferences, maintaining consultive services, developing an evaluation manual, analyzing school data, and preparing project reports.

Purpose of the Evaluation. The project was evaluated to determine the extent to which it met its stated objectives.

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[7]Kentucky Research Coordinating Unit, *Central Kentucky Vocational Education Evaluation Project. Final Report* (Lexington: Kentucky Research Coordinating Unit, October, 1972).

Methodology. Seminars conducted by the VEEP staff were evaluated by participants responding to questionnaires. VEEP staff members made periodic visitations to participating local school districts to observe the evaluation efforts and to interview local leadership teams. Each participating school district was asked to prepare quarterly reports of their activities which supplied further evidence of local involvement. At the conclusion of the project, a follow-up questionnaire was sent to all participants to determine their perceptions of project effectiveness.

Results. A formal model for evaluation of vocational education was adapted from several sources including those developed in Michigan (Byram, 1965). An instrument to obtain follow-up information from former vocational education students was developed and utilized by 12 participating school districts. Several workshops were conducted for school district staff members to assist them in acquiring the abilities and knowledges necessary to perform an adequate program evaluation and develop measurable performance objectives. The project also developed and maintained effective public relations through the use of various media, including a newsletter.

SOME CONSIDERATIONS FOR PROGRAM EVALUATION

For discussion purposes, the planning and evaluation system used in the VEEP project (Kentucky Research Coordinating Unit, 1972) will be used as a guide when discussing some of the things one should consider when evaluating a vocational-technical education program (see Figure 1).

The reader should understand that this is only one example of a system or model for evaluation. Many different systems exist, varying in complexity, design and intent. For examples of other systems, the reader is referred to Provus (1969), Stufflebeam (1971), EPIC Evaluation Center (n.d.), and Stake (1967). This is not an exhaustive listing of evaluation systems, but it does provide for a wide variance in methodological approaches.

There are at least two important considerations when choosing a system for evaluation:

1) Is the system appropriate for the situation to be evaluated?

2) Are the evaluator and others concerned capable of handling the complexities of the system?

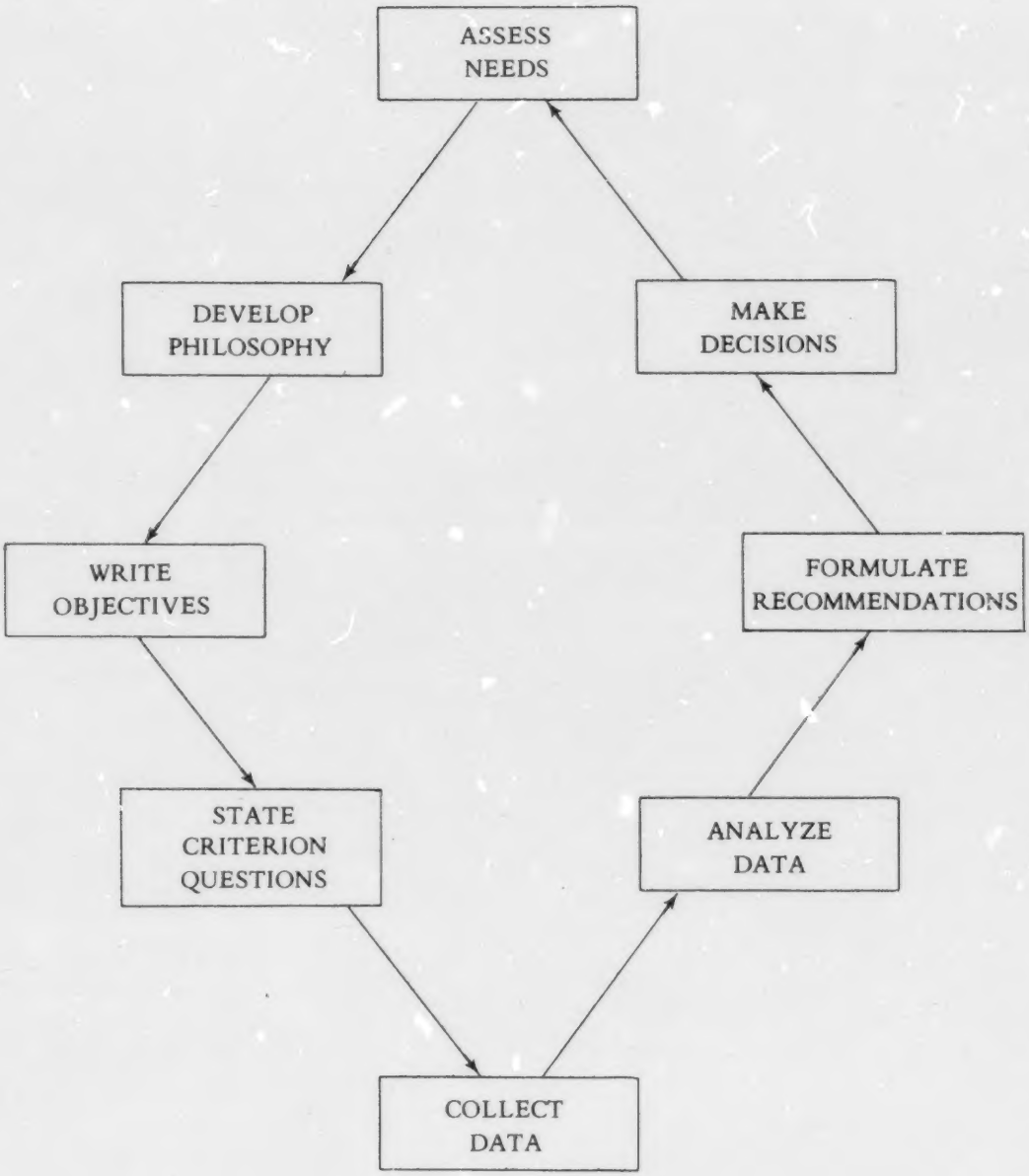

FIGURE 1.–PLANNING AN EVALUATION SYSTEM

It is uncomfortable and counter-productive to be saddled with an evaluation system too complex for some of the participants. As Majer (1972) points out when referring to a situation involving the CIPP model:

> One of the basic, pervading problems was the use of a moderately complex model for evaluation, the CIPP model. This is no indictment of the model. It is based on sound theory and can be very useful in program evaluation. The problem rather was a result of the model being somewhat complex to use with participants (staff, graduate students, and school personnel) whose professional expertise is in other areas. It is not a model for people untrained in evaluation. One bit of evidence for this was the continued confused discussion (and resulting frustration) about whether a given activity was "context" or "input" evaluation. In reality this is not an important question. The important question is whether one can develop a strategy for getting valid information necessary to make decisions . . . . "

Majer suggests choosing a rather straightforward system for evaluation and examining some of the considerations along the way through the system.

Assess Needs

Kaufman contends that,

> the identification of needs is a discrepancy analysis that identifies the two polar positions of:
>
> Where are we now?
> Where are we to be?
>
> and thus specifies the measurable discrepancy (or distance) between these two poles (1972:29).

The actual assessment of needs can be accomplished in any number of ways from a community analysis (Cromer, 1968), to a determination by authorities. Regardless of how needs are assessed, it is important to the planning process that the information gained is valid. From the discrepancy identified through the needs assessment, an idea is formulated to, hopefully, remove the discrepancy.

Develop Philosophy

Before a remedial program (to overcome the identified discrepancy) can be developed, a basic guiding philosophy should be developed. One of the concerns for such a philosophy

should be: "Whether or not the remediation can be effected entirely through the effort of the local agency or should outside assistance be recruited?" Perhaps the decision is made to adapt some innovation developed elsewhere to fit the local situation. In such a case, an evaluation scheme such as that reported by Hull and Wells (1972) would be appropriate to assist in choosing the correct innovation. Whatever philosophy is chosen for guiding the development of the remediation, it should not be viewed as inviolate, but changeable if evidence is presented indicating a need for change.

Write Objectives

Now that a need has been determined and a guiding philosophy developed, program objectives should be identified. These may be written, as in the case of a locally developed program, or adapted from an existing program. Regardless of the source, as Bloom (1971) points out, to facilitate the evaluation process, objectives must be "meaningful, unambiguous statements of intended educational outcomes." Often objectives are written that only identify inputs rather than outcomes. An example might be:

"Staff development will be provided for teachers."
or
"The students will view a 30 minute film."

This type of an objective can be evaluated quite easily by verifying the input, but unless some outcome is specified, the evaluation cannot say whether or not any desired results occurred. The program objectives will determine to a large extent the evaluation that is conducted; therefore, time and energy spent in their careful construction will bring many benefits.

If the program is of an instructional nature, then the research reported to date suggests that behavioral objectives are probably beneficial (Walbesser, 1972). There seems to be a positive effect from having the learner informed of the expected learning outcomes, and learner knowledge of the objectives seems to increase the rate of acquisition as well as decrease the rate of forgetting. A number of publications are available to assist in developing behavioral objectives, including Popham (1970), McAshan (1970) and Walbesser (1970). Critics of behavioral objectives (Eisner, 1972) generally see them as producing too narrow a view of education.

State Criterion Questions

An evaluator has been characterized as an extension of the mind of the decision-maker (Stufflebeam, 1971). His role has two major components—the technical and the interface.

It is within this interface role that the evaluator must couch the evaluation's criterion questions. Scriven (1967) has typified evaluation as attempting to answer certain types of questions about various educational processes, programs, and the like.

In the evaluation system used in this paper, the evaluator, within his interface role and by paying attention to the program objectives, can develop a meaningful list of criterion questions. Welty (1970) describes the painstaking steps necessary in the development of a series of questions to formulate an evaluation design. He advocates that the evaluator meet personally with people interested in the program so that they will have input into the development of the evaluation design.

It is the opinion of this author that a formal document should be made of the criterion questions, along with all appropriate information relative to what data will be collected for each question, by whom it will be collected, and when it will be collected. This document should then be approved by the appropriate authority, i.e., in the case of a local school district, the school board. For an example of an evaluation design, the reader is referred to Fielstra (1971).

Collect Data

The collection of data and its subsequent treatment can be classified generally into two major activities. The first is the monitoring of the project as it is implemented. The second is measurement of attainment before, after and as many times as necessary during the project. These two activities have been variously defined and named in the literature. Scriven (1967) and Bloom (1971) refer to them as formative and summative evaluation. Stufflebeam (1971) and others refer to them as process and product evaluation. For the remainder of this paper, the latter classification scheme will be used. Process evaluation is explained as providing

> . . . periodic feedback to persons responsible for implementing plans and procedures. It has three objectives: (1) to detect or predict defects in the procedural design or its implementation during the implementation stages (2) to provide information for programmed decisions and (3) to maintain a record of procedure as it occurs (1971:229).

Product evaluation "measures and interprets attainments at the end of the project cycle and as often as necessary during the project term" (Stufflebeam, 1971:232).

Certainly both process and product evaluation are needed. As Glaser (1972) said in discussing his model which he calls the "clinical approach":

assessments of research or service efforts will be most meaningful and useful if they are designed to evaluate the program as a whole and as a dynamic, complexly interrelated entity.

If a program should be assessed by product evaluation only, a great deal of risk exists in not knowing what the program really was.

Norton was certainly correct when he said, "to evaluate process is much easier said than done" (1972:62). However, authors such as Eisner (1972) make a strong case for the careful observation and description of the program environment. It has been the observation of this author that careful attention to process evaluation has at least two major redeeming qualities which make it worth the large expenditure of resources. First, it demands that the evaluator become well informed with the functioning of the program and the complex interrelatedness of the many variables involved. Second, information provided from periodic observations serves to alert management to any design-implementation discrepancies.

Product evaluation needs little if any justification, since it is aimed at the measurement of program attainments. However, a thorough consideration for the many data sources for product evaluation is necessary for a comprehensive evaluation (Webster, 1973).

There are many types of data that can be collected and different methods of collecting them. Some of the more common ones are discussed below with additional sources of information included where appropriate.

One of the more obvious methods of data collection is researching the school files and records. These files include such items as student cumulative records, and personnel, business, and attendance records. As with other data, these data should be handled in such a way so as to insure individual anonymity. Some of the types of data which can be obtained by searching existing records are:

1) student demographic data including birthdate, grade point average, attendance, address, and test scores;

2) teacher demographic data including years of experience, major and minor field, and degrees held; and

3) school demographic data including enrollment by grade, by section, average daily attendance, and schedule of classes (Webster, 1973).

Individual and group testing is one of the most widely used methods for obtaining evaluative data. There are a number of sources available to the reader which discuss the various tests that are presently available. Probably the most well known is the Mental Measurements Yearbook series (Buros, 1972).

Findley (1971) has an important discussion of factors that affect test results. He points out the importance of test administration, scoring and recording as they effect the results. It is important that the evaluator monitor at least a sample of each test administration to identify any possible problems. Clemans (1971) presents a list of general recommendations for proper planning of test administration which should assure smooth testing procedures.

As Seibel (1968) points out, achievement tests, scholastic aptitude tests and intelligence tests are quite similar.

> In fact, if we were to look at an item from a test without knowing its source, it would be difficult and perhaps impossible to specify with assurance whether the item came from a test that is labeled as an achievement test, a scholastic aptitude test, or an intelligence test (1968:265).

Of the three groups of tests, perhaps the type of test most often used for program evaluation is the achievement test (Downie, 1967).

A second group of tests are those classified generally as attitude–interest tests. Particularly the vocational interest tests have proven effective to counselors. Downie (1967) identifies the problems with attitude tests as:

1) Low correlation between measured attitudes and observed behaviors;

2) Low consistency between specific items and general concepts;

3) Change in attitudes over time; and

4) The interpretation of neutral attitude.

He also identifies some problems with vocational interest inventories as:

1) They can be faked.

2) They have a high level of reading difficulty.

3) The possibility exists of always receiving socially acceptable responses (Downie, 1967).

A third classification of tests are criterion-referenced tests. Brazziel (1972) explains criterion-referenced tests as measures of "student progress toward explicit objectives as defined by the school enterprise. They are measures of degree of mastery of material taught and learned in a specific time frame." Thus, from a student's incorrect response to a criterion-referenced item or set of items, a teacher can prescribe further remediation for the student by referring back to the antecedent objective. A number of test publishers are currently publishing and marketing criterion-referenced tests.

Questionnaires and interviews are also widely used methods of collecting data for evaluation purposes. Phillips lists the relative ease with which an evaluator can obtain a great deal of information from a probability sample as one of the virtues of these methods (Phillips, 1966). Questionnaires and interview schedules can vary from open-ended to closed-form instruments. The closed-form instrument is advised when categorized data is needed, whereas the open-ended instrument is best suited for preliminary exploration of untried situations.

The primary considerations in developing questionnaires and interview schedules are: (1) keep the questions simple and concrete, (2) questions should not be open to subjective evaluation, and (3) do not bias the response (Young, 1966). Young contends that a carefully worded questionnaire provides privacy and anonymity while an interview conducted by a well trained interviewer is a highly flexible tool. Either method, of course, should be pilot tested before using.

The author has found that interviewing a sample of respondents and, if possible, non-respondents to a questionnaire survey is well worth the extra effort. Verification of how subjects are interpreting questions can be obtained by interviewing respondents and an indication of bias introduced from not having a 100 percent return can be determined by interviewing non-respondents.

Direct observations are another method of data collection. Although this method is very time consuming and thus costly, the author has found the information gained well worth it.

Roberson (1970) presents six different observational categories. This discussion will be limited to on-site activity observations or "what people do." He gives several recommendations for selecting or developing an observation system.

1) The observation system should include terms.

2) The terms should be simply defined.

3) Examples of the activities to be observed should be given.

4) The observer should be provided an easy format for coding observations (1970).

Phillips (1966) recommends combining the interview technique with observation. The two methods complement each other since interview data provide what the subject says he does while observation data provide information about what he actually does.

From the experience of the author, it has been found that when observing classrooms, teachers appreciate knowing what the observer is doing. Results of observations can be discussed with teachers; and if observations are to be maintained over a period of time, better rapport will result. It is realized that there is a danger of biasing the situation by telling the teacher what is being observed, but experience has shown that when classroom activities are being periodically observed, teachers tend to ignore the observer.

Another method of data collection is through the use of unobtrusive measures (Webb, 1966). This type of measurement is difficult to design. An example is measuring the extent that books are read by judging the amount of wear and tear on the book itself.

Regardless of the method used for collecting evaluative data, there are different means of collecting it. Teachers can collect it (Education Service Center, Region 1, 1972); students can collect it, and internal evaluators can collect it (David Douglas Public Schools, 1972); and the community can provide it (Byerly, 1972).

Two separate types of vocational education program evaluation require a little different collection of data or possibly a different use of data. Follow-up studies are designed to determine what former students are doing after leaving the program and how the program effectiveness is perceived. Voelkner (1971) lists the variables of interest in a follow-up study as:

1) length of time a graduate takes to find a satisfactory job,

2) employment security,

3) length of time on the job,

4) earnings progression, and

5) rate of advancement.

Wilson (1971) sees the follow-up of students as a way of increasing vocational education accountability with the community by making business and industry more aware of the programs. Follow-up studies also provide information relative to program changes (Jacobson, 1971; Elson, 1972).

Cost-effectiveness studies are an attempt to attach costs to program inputs and/or outputs. Kaufman (1969) provides an introductory discussion of the subject. Connor (1972) purports to shows how cost-benefit analysis can be used to determine the most effective way of combining vocational education with general education. Stanton (1970) shows how the costs of vocational education are far less than for manpower programs. It is the opinion of the present author that trying to attach costs to program inputs can be accomplished with reasonable satisfaction. However, trying to attach costs to program outputs is very difficult because of problems of definition and measurement.

Analyze Data

There are a host of books related to methods of statistical data analysis. Two excellent general texts are by Hayes (1972) and Glass (1972). There are also a number of books that discuss the use of computers in analyzing statistical data. An introductory one is by Veldman (1967) while Cooley (1971) has a more advanced one. The author will not attempt to discuss the many ways available to analyze data; however the evaluator should ascertain that the analysis is appropiate to the data collected. As a matter of routine, all computer programs should be tested on a set of sample data before being used on actual data.

Since the present system for evaluation being used for this paper does not indicate where reporting of data should appear, the author has chosen to insert it at this point. It has been the experience of the author that unless the report is written in a brief, easy to understand manner it will turn more people off than on. If a sophisticated statistical analysis is needed, by all means than the evaluator should do it; but when the report is written, the analysis should not so confuse the reader that the results are lost. An "executive summary" similar in form to that used in the second section of this paper should precede any report. This will facilitate understanding on the part of the reader.

Formulate Recommendations

The evaluator is obligated to provide any information suggested by the data as possible methods for improving the program (Cameron, 1971). This author concurs; however, the evaluator must be cautious and recommend only that which is suggested by the data. The recommendations should appear in both the executive summary and in the text of the report.

Make Decisions

Hopefully, through the use of process evaluation, information has been provided to management since the inception of the program and many decisions have been made (Stufflebeam, 1971). The evaluator should not be surprised if a recommendation is not acted upon; there is a political dimension to the decision-making process.

Decisions can be made to start the evaluation cycle all over again by reassessing needs or go to some other phase of the cycle.

SOME FURTHER CONSIDERATIONS ABOUT PROGRAM EVALUATION

There are two aspects of the evaluation of the Skyline Career Development Center in Dallas, Texas that seem to extend beyond anything currently found in the literature. The Career Development Center is a large complex housing 28 career clusters. Any senior high student in the Dallas Independent School District is eligible to apply for enrollment in any of the career areas. Transportation from each of the local high schools to the Career Development Center is provided. The clusters are organized in a three hour instructional block of time so that a student is only in a given cluster for either the morning or afternoon session. The instructional staff consists of 103 instructors for a student population of about 2,350.

Context Evaluation

In an attempt to get an accurate profile of the Career Development Center student population, a great deal of information on each student is obtained and recorded in computer files. The following is a list of all data sought for each student.

1) Identification number

2) Home school

3) Birth date

4) Parent name

5) Address

6) Phone number

7) Sex

8) Ethnic background

9) Grade level

10) Cluster–(course)

11) Period of day (A.M. or P.M.)

12) Parent occupation

13) Mode of transportation to Skyline

14) Scores from 9th grade Iowa Tests of Educational Development

15) Scores from 8th grade California Test of Mental Maturity

16) Social Security Number

17) Previous Career Development Center attendance

18) Scores from Armed Services Vocational Aptitude Battery

The information within the data base is updated as changes occur. Computer generated analyses of the student data are produced in the fall, at the end of the first semester, and again at the end of the school year. With the computerized data base it is relatively easy to generate a random sample of students, report periodically on the withdrawal rate, and provide instructors and administors with different types of information needed for annual reports.

Upon graduating from the Career Development Center, a student's record is moved to the graduate file which is used to conduct an extensive follow-up evaluation. Currently this information is being used to research cost-effectiveness as it relates to obtaining follow-up information.

Process Evaluation

In order to provide information relative to program implementation, classroom activities are regularly monitored by trained observers. Three rounds of observations are scheduled each year. A round of observation is defined as the length of time necessary to observe all clusters. For each round of observations a different set of factors are observed. The design for process evaluation is graphically represented in Figure 2.

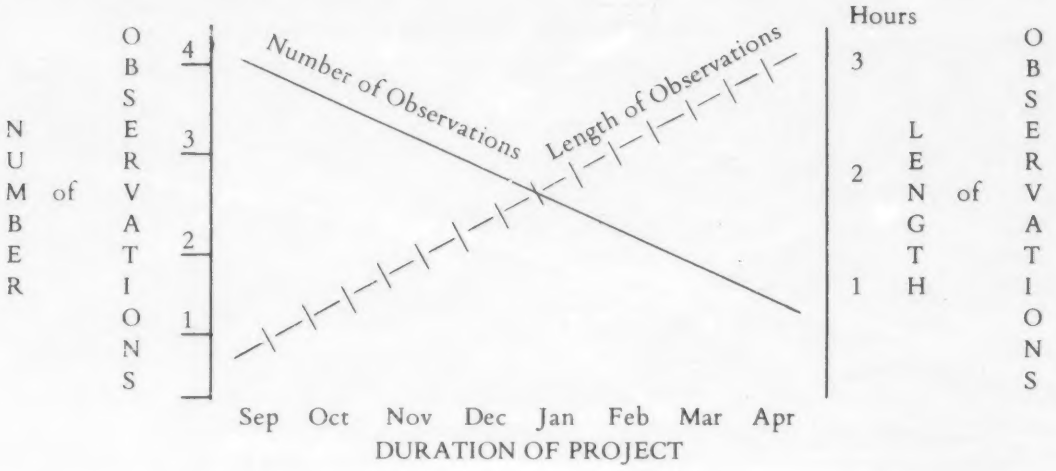

FIGURE 2.–NUMBER OF OBSERVATION vs LENGTH OF OBSERVATION PER ROUND OF OBSERVATION

At the beginning of the project year, four observations of approximately 20 minutes each are made in each cluster. For this first round of observation, the factors being observed include such things as adequacy of facilities and materials. During this time, one short interview with each instructor is conducted. By the end of the year, the observations consist of one observation of about three hours duration for each cluster. During this time, students are interviewed to determine their attitude and perceptions. The reader must realize that Figure 2 is only a "road map" and in actual practice the number and length of observations will vary to fit the situation. The overall design seems to work well since the frequent short visits initially help the evaluator develop rapport with the situation and the various instructors. By the end of the year, the student information gained from the interviews is very valuable. Reports on process evaluation information are provided to management about every two weeks or sooner, depending on the frequency of visits.

EPILOGUE

Kindschy (1971) makes a strong point for the evaluation of the vocational education department by advisory councils. The author sees a great deal of value in using the business and industrial community as sources of information. What better judges can be chosen for program evaluation, particularly curriculum validation, than the final users of the product of vocational education, the employers. This type of validation, coupled with hard data to verify student and staff satisfaction, student achievement, and cost-effectiveness, will comprise a comprehensive evaluation.

Of course evaluation costs money, and the plea for funds has gone out (National Advisory Council on Vocational Education, 1971). If a justification for further expenditures is needed, then heed what Armstrong (1969:16) says:

> A primary defense against an undesirable reaction to the many good programs in Vocational Education is careful evaluation of results to insure the elimination of defective ones before they create a public scandal.

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